

SUSPENSION STRUCTURE FOR FRONT WHEEL ASSEMBLY

OF WHEELCHAIR

BACKGROUND OF THE INVENTION

Field of the Invention

5 The present invention relates to a suspension structure for front wheel assembly of a wheelchair, and more particularly to a suspension structure for front wheel assembly of a wheelchair that is capable of saving production cost with its simple structure as well as reducing the kinetic energy dissipation to the least.

Description of the Prior Arts

10 Referring to Fig. 1, a conventional suspension structure of wheelchair generally includes a frame 10 provided with a driving wheel 11 at both sides thereof respectively, both of the driving wheels 11 are driven by a motor 12, at both sides of the frame 10 is further defined with
15 an ear member 13 respectively and each of which is connected with a first connecting rod 14 correspondingly. The connecting rods 14 each has an end connected with the motor 12 and another end protruded ahead of the frame 10. Furthermore, a mounting bracket 15 is defined at both sides of the front end of the frame 10 respectively and at the end of each
20 mounting bracket 15 is disposed with a jockey wheel 16. A side of each mounting bracket 15 is connected with that of the front end of the connecting rod 14 by virtue of a connecting plate 17, furthermore, a roller 171 is disposed in the connecting plate 17, so as to allow the mounting

bracket 15 to rotate relative to the connecting rod 14, and vice versa.

By such arrangements, the mounting brackets 15 are able to rotate upward when the jockey wheels 16 are traversing a curb or other upstanding obstacle, and the connecting rod 14 will be driven to rotate
5 downward by virtue of the connecting plate 17 as well as the roller 171, so as to increase the load on the driving wheels 11 and thus increase the friction of the driving wheels 11 with respect to the road. By this way, the driving wheels 11 are able to push the jockey wheels 16 by force to climb over the curb. However, there are some disadvantages of this
10 conventional suspension structure for jockey wheel of wheelchair need to be improved as follows:

First, upon encountering a curb, the connecting rod 14 will actuate so as to increase the load on the driving wheels 11 and thus the driving wheels 11 are able to push the jockey wheels 16 to traverse the
15 obstacle by force. Thereby this method of traversing the curb will cost a great kinetic energy of the motor 12, viz. a great dissipation of electrical energy.

Second, the driving wheels 11 and the mounting brackets 15 need to be provided with connecting plates 17 as well as connecting rods
20 14, it is not only complicated in structure but also will increase the production cost.

The present invention has arisen to mitigate and/or obviate the afore-described disadvantages of the conventional suspension structure

for front wheel assembly of a wheelchair.

SUMMARY OF THE INVENTION

The primary object of the present invention is to provide a suspension structure that has front wheel assemblies disposed at
5 corresponding brackets of a frame of wheelchair, wherein the front wheel assemblies will rotate upward about the corresponding jockey wheels upon encountering a curb or other obstacle of the like, such effects an uplift of the front end of the frame of wheelchair, and meanwhile the gravity center of the user as well as frame of the wheelchair will move
10 backward, so as to reduce the load on the jockey wheels, by this way, the jockey wheels of the wheelchair are able to climb over the curb without difficulties. Since the conventional wheelchair traverses the curb through the movement of the user's gravity center, this method enables the wheelchair of the present invention to traverse the curb with the least
15 kinetic energy.

Another object of the present invention is to provide a suspension structure for front wheel assembly of a wheelchair, which is capable of traversing a curb or other obstacle of the like without difficulties, furthermore, it is simple structured relative to conventional
20 wheelchair so as not only to facilitate the assembly but reduce the production cost as well.

The present invention will become more obvious from the following description when taken in connection with the accompanying

drawings, which shows, for purpose of illustrations only, the preferred embodiments in accordance with the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a side view of a conventional suspension structure for
5 front wheel assembly of a wheelchair;

Fig. 2 is a perspective assembly view of a suspension structure for front wheel assembly of a wheelchair in accordance with the present invention;

Fig. 3 is an exploded view of the suspension structure for front
10 wheel assembly of a wheelchair in accordance with the present invention;

Fig. 4 is an illustrative view of showing the performance of suspension structure of the present invention for front wheel assembly of a wheelchair upon encountering a curb;

Fig. 5 is another illustrative view of showing the performance of
15 suspension structure of the present invention for front wheel assembly of a wheelchair upon encountering a curb;

Fig. 6 is a third illustrative view of showing the performance of suspension structure of the present invention for front wheel assembly of a wheelchair upon encountering a curb;

20 Fig. 7 is a fourth illustrative view of showing the performance of suspension structure of the present invention for front wheel assembly of a wheelchair upon encountering a curb;

Fig. 8 is an exploded view of the suspension structure for front

wheel assembly of a wheelchair in accordance with another embodiment of the present invention;

Fig. 9 is a plan assembly view of Fig. 8;

Fig. 10 is another plan assembly view of Fig. 8.

5 **DETAILED DESCRIPTION OF THE PREFERRED**
 EMBODIMENTS

Referring to Figs. 2-3, wherein a pair of front wheel assemblies 30 is installed on a frame 20 of wheelchair by virtue of positioning bolts 40, on both sides of the frame 20 is provided with a driving wheel 21
10 respectively and each of which is driven by a motor 22.

The frame 20 is provided with a mounting bracket 23 at both sides respectively, on each of which is defined with a pair of holes 24 and at the bottom of the same a slot 25 is formed. The driving wheels 21 are located at the rear portion of the frame 20.

15 Each of the front wheel assemblies 30 includes a jockey wheel 33 disposed at the front end of a strut 31 by virtue of a pedestal 32. At both sides of the rear end of each strut 31 thereof an opposite holes 34 is defined respectively with corresponding to the holes 24 on the mounting brackets 23 of the frame 20. A bolt 35 is applied to insert in the holes 24
20 of each mounting bracket 23 and those holes 34 of the corresponding strut 31. At the bottom of the rear end of each strut 31 a slot 36 is defined with corresponding to the slot 25 in the corresponding mounting bracket 23 of the frame 20, and alike, at top surface of the same is formed with a

locating hole 37 with corresponding to the slot 36 at the bottom.

The positioning bolts 40 serve to insert in the locating holes 37 and the slot 36 of the corresponding front wheel assembly 30 as well as the slot 25 on the mounting bracket 23 of the frame 20. A rubber ring 41
5 is mounted onto the positioning bolt 40 and located between the mounting bracket 23 of the frame 20 and the strut 31 of the front wheel assembly 30, still on the positioning bolt 40 another rubber ring 42 is mounted and located above the locating hole 37 of the corresponding front wheel assembly 30.

10 Referring to Figs. 4-7, when the wheelchair runs on the a smooth road, the weight of the user and the wheelchair will be equally loaded on the two driving wheels 21 as well as the jockey wheels 33 of the front wheel assemblies 30. However, the jockey wheels 33 of the front wheel assemblies 30 will be stopped at a very beginning of encountering a curb
15 or other upstanding obstacle. At the moment, the two driving wheels 21 are rotating forward, thus the jockey wheels 33 work as a fulcrum and the strut 31 of each front wheel assembly 30 will rotate about it upwardly. Since the strut 31 of each front wheel assembly 30 is disposed on the mounting bracket 23 of the frame 20, the upward rotation of the strut 31
20 of the front wheel assembly 30 will cause an upward movement of the front end of the frame 20 (as shown in Fig. 5). After the upward movement of the front end of the frame 20, the frame 20 will tilt backward. And the user will tilt backward along with the frame 20. It

will be noted that, at the moment, the gravity center of the user as well as the frame 20 load on the paired driving wheels 21, such that the weight on the jockey wheel 33 of each front wheel assembly 30 is lightened. By this way, the jockey wheel 33 of each front wheel assembly 30 may
5 traverse the curb or the like without difficulty cause it is driven by the forward rotation of the driving wheel 33 of the respective front wheel assembly 30 (as shown in Fig. 6). After the jockey wheel 33 of each front wheel assembly 30 climbed over the curb, the weight of the user and the frame 20 will move forward, so as to increase the load on the mounting
10 brackets 23 of the frame 20. At the same time, the rubber ring 42 above the locating hole 37 of the strut 31 can alleviate the shock caused by an increased load on the mounting brackets 23 of the frame 20. It will be noted that the rubber ring 42 is not a necessary element, which just plays a role of comforting the riding in traversing a curb or the like (as shown
15 in Fig. 7).

Thereby, according to the present invention, when the jockey wheel 33 of each front wheel assembly 30 approaches a curb or other upstanding obstacle, the strut 31 of the front wheel assembly 30 will upward rotate about the corresponding jockey wheel 33 and cause an
20 upward movement of the front end of the frame 20, at the same time, the gravity of the user as well as the frame 20 move backward so as to alleviate the load on the jockey wheel 33 of the front wheel assembly 30, such that enables the jockey wheel 33 of the front wheel assembly 30 to

traverse the curb easily. In other words, in terms of design, the method of traversing a curb in accordance with the present invention by taking advantage of the movement of the gravity center of the user that is different from that of conventional wheelchair by totally relying on the strong propulsion of the driving wheels 21. The movement of the gravity center of the user may cause an alleviation of load on the front wheel assembly 30 so as to enable the driving wheels 21 move forward on as well as reducing kinetic energy dissipation of the driving wheels 21.

In addition, the structure of the present invention is rather simple as only having the strut 31 of the front wheel assembly 30 disposed on mounting bracket 23 of the frame 20, which is simple structured relative to conventional wheelchair so as not only to facilitate the assembly but reduce the production cost as well.

Referring to Figs. 8-9, which shows a suspension structure of front wheel assembly of wheelchair in accordance with another embodiment of the present invention, wherein the positioning bolt 40 can be inserted upward through the slot 25 of the mounting bracket 23, the rubber ring 41, the positioning holes 37, the slot 36 of the front wheel assembly 30 and the rubber ring 42 respectively, and then a sleeve 43 is mounted onto the top end of the positioning bolt 40 and finally locked by an adjusting screw nut 44. By such a manner, the length of the positioning bolt 40 may be adjusted by adjustment of the adjusting screw nut 44. The sleeve 42 of the positioning bolt 40 moved by rotating the

adjusting screw nut 44, such that the user is able to adjust the elastic force of the rubber rings 41, 42 of the positioning bolt 40 on the basis of his/her own weight. For instance, for a heavy weight user, he/she may
unloose the adjusting screw nut 44 moderately so as to lengthen the
5 operation range of the positioning bolt 40 (the rubber rings are under a light pressure), vice versa, the light weight user may shorten the operation range of the same, so as to make the riding comfortable.

Referring to Fig. 10, wherein the positioning bolt 40 can be provided at the external periphery thereof with a spring 45, so as to
10 prevent the strut 31 of the front wheel assembly from swaying up and down when moving the wheelchair, furthermore, it is able to increase the elastic force of the rubber ring 41.

While we have shown and described various embodiments in accordance with the present invention, it should be clear to those skilled
15 in the art that further embodiments may be made without departing from the scope of the present invention.